LOADER LINKAGE

Field of the Invention

[0001] The present invention is directed to a Z-bar loader linkage having a bell crank that is pivotally coupled to the loader frame by a leveling link independent of the boom.

Background of the Invention

[0002] Loaders are work vehicles having a loader linkage comprising a pivotal boom for vertically positioning an attachment coupled to the boom. The loader linkage is typically provided with an attachment tilt linkage for manipulating the angular position of the attachment relative to the boom.

[0003] One type of loader linkage is a Z-bar linkage. In a Z-bar linkage one end of the boom is pivotally mounted to a loader frame and the other end of the boom is pivotally attached to the attachment. The attachment may comprise a tool coupler to which a work tool is releasably mounted, or the attachment may comprise the tool itself. The Z-bar linkage comprises a bell crank having a bell crank pivot that is coupled to the boom. A hydraulic cylinder extending from the loader frame to the driven end of the bell crank pivot, pivots the bell crank relative to the boom moving the drive end of the bell crank. The drive end of the bell crank is coupled to the attachment for changing its angular position relative to the boom.

Summary of the Invention

[0004] It is an object of the present invention to provide a loader linkage having good breakout force and parallel lift characteristics.

[0005] It is a feature of the present invention that the loader linkage is a Z-bar linkage having a floating bell crank.

[0006] The loader linkage of the present invention comprises a loader frame to which is mounted a boom. The loader end of the boom is pivotally mounted to the loader frame by a boom pivot and is pivoted relative to the loader frame by a boom lift hydraulic cylinder. The other end of the boom, the attachment end, is pivotally coupled to an attachment by an attachment pivot. The loader linkage is also provided with an attachment tilt linkage for controlling the angular position of the attachment relative to the boom. The attachment tilt linkage comprises a floating bell

crank having a bell crank pivot that is coupled to the loader frame by a leveling link independent of the boom. The driven end of the bell crank is coupled to an attachment tilt hydraulic cylinder extending from the driven end of the bell crank to the loader frame. The drive end of the bell crank is provided with an attachment link that extends to the attachment. A guide link extends between the attachment link and the boom.

Brief Description of the Drawings

[0007] Fig. 1 is a side view of a four wheel drive loader.

[0008] Fig. 2 is a side view of the loader linkage.

[0009] Fig. 3 is a top perspective view of the loader linkage.

[0010] Fig. 4 is a top perspective view of an alternative embodiment of the loader linkage.

Detailed Description

[0011] Fig. 1 illustrates a work vehicle comprising a four wheel drive loader 10. The four wheel drive loader 10 is provided with an articulated frame having a loader frame 20 that is pivotally coupled to a rear frame 30 by vertical pivots 40. The loader 10 is steered by pivoting the loader frame 20 relative to the rear frame 30 in a manner well known in the art. The front and rear frames 20 and 30 are respectively supported on front drive wheels 22 and rear drive wheels 32. An operator's station 34 is provided on the rear frame 30 and is generally located above the vertical pivots 40. The loader frame 20 includes a mast 21 formed by a right mast portion 21a and a left mast portion 21b. The front and rear drive wheels 22 and 32 propel the vehicle along the ground and are powered by an internal combustion engine, not shown, through a suitable transmission. The internal combustion engine is located on the rear frame 30. Although the present invention is disclosed as being used on a wheeled work vehicle it can also be used on belted or tracked work vehicles.

[0012] The loader frame is provided with a loader linkage comprising a boom 50 that is partly formed by right and left arms 50a and 50b, respectively. The middle portions of the right and left arms 50a and 50b are connected by a transverse cross

tube 52 that is welded to each of the right and left arms 50a and 50b. The loader end of the boom 50 is connected to the mast 21 by transverse boom pivots 61 and 63. An attachment in the form of a loader bucket 70 is mounted on a tool coupler 71 which in turn is mounted to the attachment end of the boom 50 by transverse attachment pivots 64, only one shown. The boom 50 is rotated about transverse pivots 64 by boom lift hydraulic cylinders 65a and 65b, the rear ends of which are, respectively, connected to the loader frame 20 at transverse pivots 67, only one shown. The front ends of hydraulic lift cylinders 65a and 65b are, respectively, connected to the right and left arms 50a and 50b at transverse boom lift pivots 66 and 68. Although the illustrated loader 10 is shown as having a bucket 70 mounted to the tool coupler 71, other attachments can be mounted to the tool coupler or directly to the attachment end of the boom 50.

[0013] The angular position of the bucket 70 relative to the boom 50 is controlled by an attachment tilt linkage 80. The attachment tilt linkage 80 comprises: a hydraulic tilt cylinder 81, leveling link 82; a bell crank 83, a guide link 84; and an attachment link 85. The hydraulic tilt cylinder 81 drives the tilt linkage 80 and extends between the loader frame 20 and the driven end of the bell crank 83 being pivotally coupled to a transverse driven pivot 91. The bell crank 83 is mounted on a transverse bell crank pivot 90 at the front end of the leveling link 82. In the embodiment illustrated in Figures 1-3, the leveling link 82 comprises right and left links 82a and 82b. As such, the bell crank 83 is independent of and floats relative to the boom 50. The drive end of the bell crank 83 is connected to the rear end of the attachment link 85 by a transverse drive pivot 92. The front end of the attachment link 85 is pivotally connected to the tool coupler 71 of the loader bucket 70 via a transverse pivot 94. A guide link 84 having right and left portions 84a and 84b extends between the middle portion of the boom 50 and the middle portion of the attachment link 85. The guide link 84 is mounted on a transverse guide pivot 93 on the attachment link 85 and on the cross tube 52 via a transverse guide tube pivot 95 carried in a support 54 welded to the cross tube 52.

[0014] The entire rear end of the attachment tilt linkage, including the rear end of the hydraulic tilt cylinder 81 and the loader end of the leveling link 82 are operatively

mounted to a removable linkage pin support 100. The removable linkage pin support 100 is rigidly connected to the loader frame 20 at load bearing areas via bolts.

[0015] The leveling link 82 is pivotally coupled to the removable linkage pin support 100 and in turn the mast 21 by leveling link pivots 96. The leveling link pivots 96 are located above and behind the boom pivots 63. The tilt cylinder 81 is pivotally coupled to the removable linkage pin support 100 and in turn the mast 21 by tilt cylinder loader pivots 97. The tilt cylinder loader pivots 97 are located below and behind the boom pivots 63.

[0016] In an alternative embodiment illustrated in Figure 4 the leveling link 82 comprises a single Y-link. The Y-link has two legs 120 that are pivotally coupled to the mast 21 by leveling link pivots 96. The base 122 of the Y-link is pivotally coupled to the bell crank by the transverse bell crank pivot 90.

[0017] Having described the illustrated embodiments, it will become apparent that various modifications can be made without departing from the scope of the invention as defined in the accompanying claims.